



THE CITY OF SAN DIEGO

City of San Diego  
Planning & Development Review  
**Building Development Review**  
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San Diego, CA 92101  
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# Building Newsletter 10-5

## Stairways

Interpretations of State and Local Building Codes  
1998 California Building Code: Chapter 10  
Revision Date: January 2000

Page 1 of 11

The purpose of this building newsletter is to provide clarifications and interpretations for Stairway provisions of the Building Code as set forth in Chapter 10, Section 1003.3.3.

In addition, this newsletter will provide procedures and guidelines for approval and permitting for construction of stairways and stairway components.

Disabled access provisions as set forth by the United States Department of Justice in the Americans With Disabilities Act of 1990, Pub. L. 101-336 (ADA) may provide more restrictive requirements than those provisions stated in the California Building Code. Design professionals are advised to consult all applicable codes.

### I. Definitions

For the purpose of this building newsletter the following definitions apply:

**Flight of stairs.** That portion of the means of egress achieving a change in elevation by means of stairway(s) between two landings.

**Handrail.** A horizontal or sloping rail intended for grasping by the hand for guidance or support.

**Nosing (Nose).** The leading edge of treads of stairs and of landing at the top of stairway flights.

**Open Riser.** The air space between tread projecting beyond the face of the riser immediately below.

**Riser (Rise).** The height measured vertically between the leading edges of adjacent treads.

**Stair.** A change in elevation, consisting of two or more risers.

**Stairway.** One or more flights of stairs, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.

**Step.** That portion of the means of egress achieving a change in elevation by means of a single riser.

**Straight runs.** Treads, Uniform in size and rectangular in shape.

**Tread (Run).** The depth measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge.

**Tread Depth (width).** The horizontal distance from the front to back of tread, including nosing when used.

**Winders.** Tapered treads that are narrow on one end and widen out, pie-shaped, toward the opposite side of the stairs. Winders are used primarily for changing

the direction of the stair.

### II. Changes in Elevation

A. All exterior elevation changes and interior elevation changes of 12 inches or more along the path of exit travel shall be made by steps, stairs or stairways conforming with the requirements of the Building Code, Ch. 10, Sec. 1003.3.3.3 or by ramps conforming to Sec. 1003.3.4.

B. Interior elevation changes of less than 12 inches along the path of exit travel serving an occupant load of 10 or more shall be by ramps conforming with the requirements of Sec. 1003.3.4.

C. Exceptions:

1. In Group R, Division 3 Occupancies (single-family dwellings) and within individual dwelling units of Group R, Division 1 Occupancies (private stairways within individual units of multi-family dwellings (apartments, condominiums, townhouses)).

2. Along aisles adjoining seating areas.

### III. Straight Stairways

A. A stair is recognized as a straight stairway where, within a flight, all treads are rectangular in shape and are of uniform size.

B. Rise. The rise of steps and stairs shall not be less

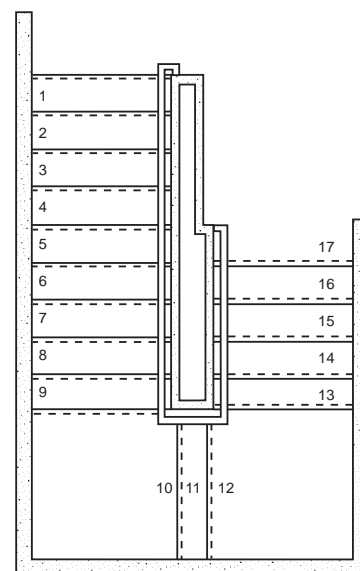


Figure 1 Straight Stairways

than 4 inches nor more than 7 inches.

- C. Run. The run shall not be less than 11 inches.
- D. Private Steps and Stairways. Private steps and stairways serving an occupant load of less than 10 and stairways to unoccupied roofs may be constructed with an 8 inch maximum rise and a 9 inch minimum run.
- E. Dimensional Uniformity. Stair treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 3/8 inch in any flight of stairs.
- F. The stairways shall comply with all other Building Code provisions such as requirements for headroom, handrails and landings. For specific requirements relating to winding, spiral, circular stairways or stairs serving as isles, refer to the respective sections.

#### IV. Winding Stairways

Winding stairs is a stairway configuration in which special treads known as winders are used. Winders are used primarily for changing the direction of the stair. The Building Code permits winding stairways in single-family dwellings and in private stairways within individual units of multi-family dwellings (apartments, condominiums, townhouses) under the following conditions ( Figure 2):

- A. Winders shall have a tread depth (run) of not less than 9 inches at a point not more than 12 inches from the narrow edge of the tread.
- B. The minimum tread depth (run) shall not be less than 6 inches.
- C. The rise shall not exceed 8 inches.
- D. Dimensional Uniformity: Stair treads and risers shall be of uniform size and shape. Winders shall be of uniform size and shall be consistently shaped.
- E. The width of stairway shall be 36 inches minimum.
- F. The stairway shall comply with all other Building Code provisions such as requirements for headroom, handrails and landings.

#### V. Spiral Stairways

A spiral stairway is a stairway having a closed circular form in its plane view with uniform section shaped treads attached to and radiating about a minimum diameter supporting column.

The Building Code permits spiral stairways in single-family dwellings and in private stairways within individual units of multi-family dwellings (apartments, condominiums, townhouses) under the following conditions ( Figure 2):

- A. When used as a required means of egress component, the area served shall be limited to 400 square feet.
- B. Treads must provide a clear width of at least 26 inches from the outer edge of the supporting

column to the inner edge of the handrail.

- C. Each tread must have a minimum dimension of 7 1/2 inches at a point 12 inches from its narrow edge.
- D. The rise shall be sufficient to provide a headroom of not less than 6 feet 6 inches.
- E. The rise shall not exceed 9 1/2 inches.
- F. Dimensional Uniformity: Stair treads and risers shall be of uniform size and shape. Winders shall be of uniform size and shall be consistently shaped.
- G. The stairway shall comply with all other Building Code provisions such as requirements for headroom, handrails and landings.

Note: Effective tread dimensions are taken along a line perpendicular to the center line of the tread.

#### VI. Circular Stairways

The circular stairways are permitted to be used as a means of egress component in any occupancy under the following conditions (Figure 2):

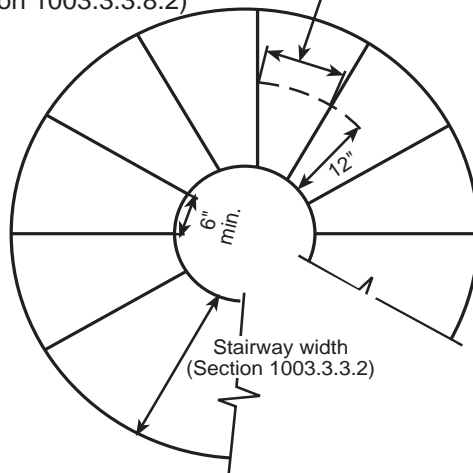
- A. The minimum width of run (tread depth) shall not be less than 10 inches.
- B. The smaller stairway radius shall not be less than twice the width of the stairway.
- C. The stairway shall comply with all other Building Code provisions such as requirements for maximum riser height, headroom, handrails and landings.

#### VII. Combination of Straight Stairways and Winding Stairways

This department permits straight stairways and winding stairways be combined together within a flight of stairs in single-family dwellings and in private stairways within individual units of multi-family dwellings (apartments, condominiums, townhouses) under the following conditions ( Figure 2):

- A. Dimensional Uniformity
  - 1. Straight stair treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 3/8 inch in any flight of stairs.
  - 2. Winders shall be of uniform size and shall be consistently shaped.
  - 3. Straight runs and winders shall provide the same required width of run at a point not more than 12 inches from the narrow end of the winders within any flight of stairs.
- B. A Handrail shall be provided at the inner side of stairway where the winders are narrowest.
- C. Steps are not allowed within any stairway.
- D. The stairways shall comply with all other provisions as set forth in the Building Code and this

Required width of run shall be provided in this location (Section 1003.3.3.8.2)

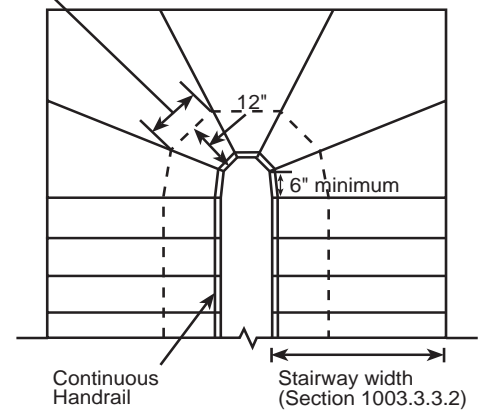


LIMITATION: APPLIES TO R-3 OCCUPANCY AND PRIVATE STAIRWAYS IN R-1 OCCUPANCY.

PLAN VIEW

### WINDING STAIRWAY\*

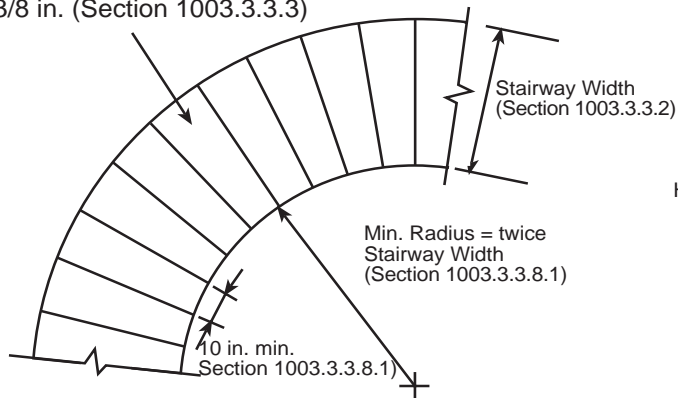
Required width of run shall be provided at this location for both straight runs and winders



PLAN VIEW

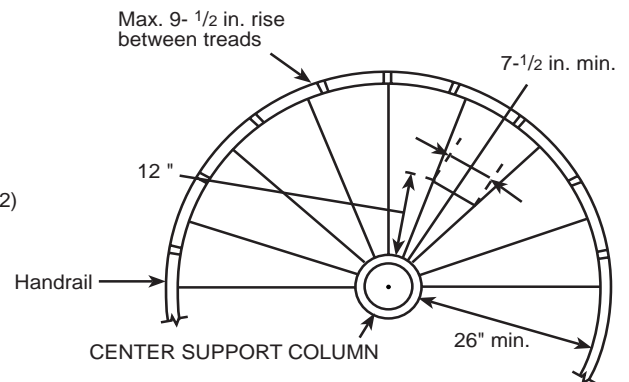
### COMBINATION OF STRAIGHT STAIRWAYS WITH WINDING STAIRWAY

The largest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 in. (Section 1003.3.3.3)



PLAN VIEW

### CIRCULAR STAIRWAY\*



PLAN VIEW

### SPIRAL STAIRWAY\*

LIMITATIONS:

1. ONLY APPLIES TO R-3 OCCUPANCY AND PRIVATE STAIRWAYS IN R-1 OCCUPANCIES.
2. LIMITED TO SERVING AS EXIT FOR 400 SQUARE FEET AREA MAXIMUM.

**Figure 2** Alternative Stairways

\* Note: 1. Handrails not shown for clarity.

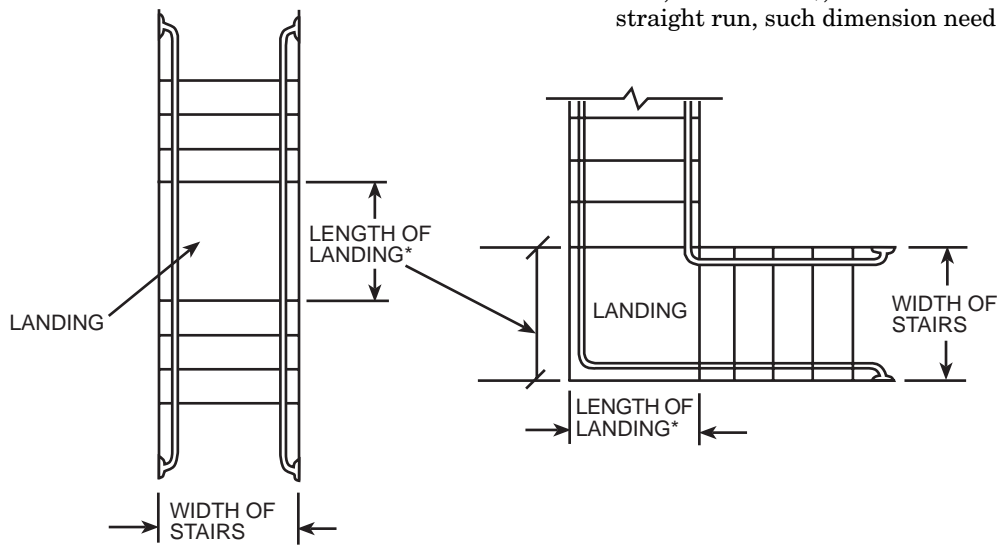
newsletter such as requirements for dimensions, headroom, handrails and landings.

### VIII. Stairway Width

The width of stairway shall be determined as specified in Section 1003.2.3, but such width shall not be less than 44 inches.

Exceptions:

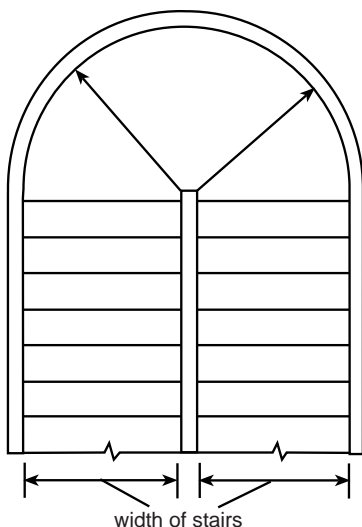
1. Stairway serving an occupant load less than 50 shall have a width of not less than 36 inches.



WIDTH OF STAIRS = (1) 36 IN. FOR OCCUPANT LOAD LESS THAN 50  
(2) 44 IN. MINIMUM FOR OCCUPANT LOADS OF 50 OR MORE  
OR AS REQUIRED BY SECTION 1003.3.3.2

\* NEED NOT EXCEED 44 IN. IF LANDING OCCURS IN A STRAIGHT RUN OF STAIRS.  
36 IN. PERMITTED FOR R-3, U AND INDIVIDUAL UNITS OF R-1 OCCUPANCY.

**Figure 3 Landing Dimensions**



**Figure 4 Alternate Shape of Landing**

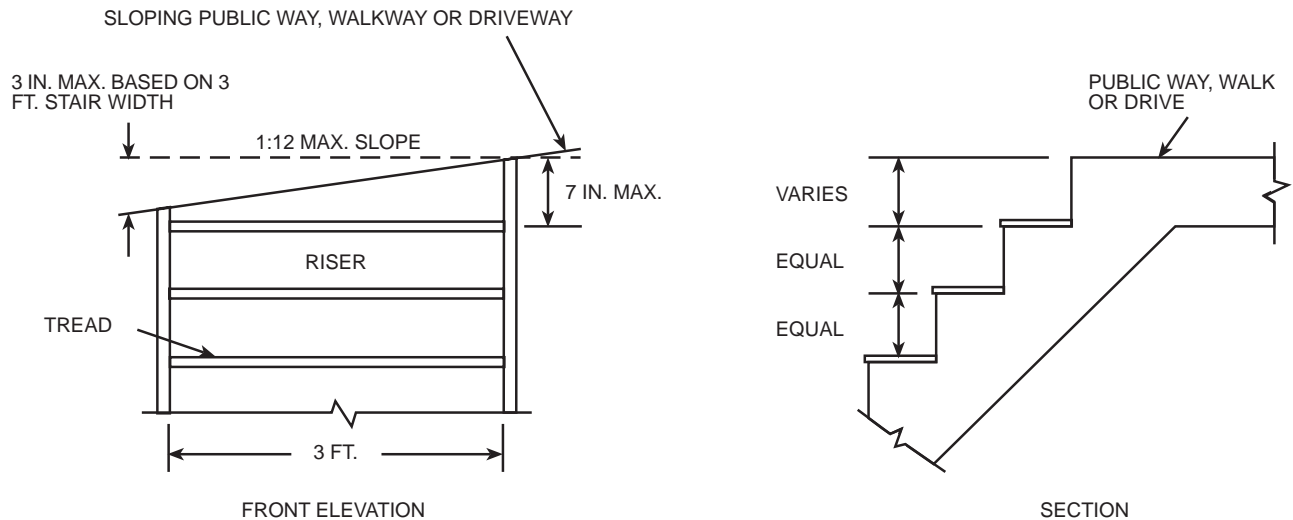
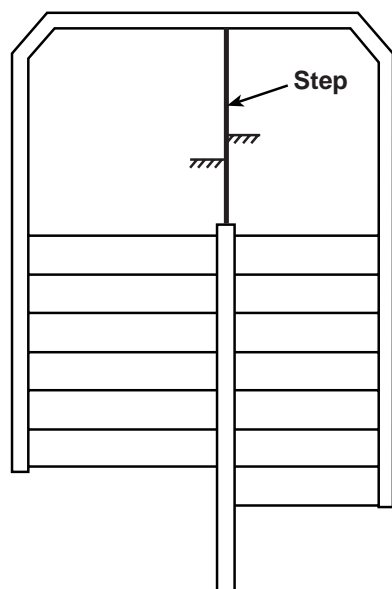
2. Spiral stairways as provided for in Section 1003.3.3.8.3.

### IX. Stairway Landings

- A. There shall be a floor or a landing at the top and bottom of each stairway. Every landing shall have a dimension measured in the direction of travel not less than the width of the stairway. In single-family dwellings and within individual units of multi-family dwellings (apartments, condominiums, townhouses), where the stairway has a straight run, such dimension need not exceed 36

inches. In all other occupancies, where the stairway has a straight run, such dimension need not exceed 44 inches.

- B. Landings shall have a width not less than the width of the stairway served. Figure (3)
- C. Width of landings with adjoining doors shall not be less than the width of the door or the width of the stairway served, whichever is greater. Doors in fully open position shall not reduce a required dimension by more than 7 inches. Where a landing serves an occupant load of 50 or more, doors in any position shall not reduce the landing dimension to less than one-half its required width.
- D. Landing shall be level except that exterior landing may have a slope not to exceed 1/4 unit vertical in 12 units horizontal (2% slope).
- E. Sloping Walkway Serving as Landing. Where the bottom or top riser adjoins a sloping public way, walkway or driveway having an established grade (other than natural grade) and serving as landing, the bottom or top riser may be reduced along the

**Figure 5** Sloping Landings**Figure 6** Step at Landing

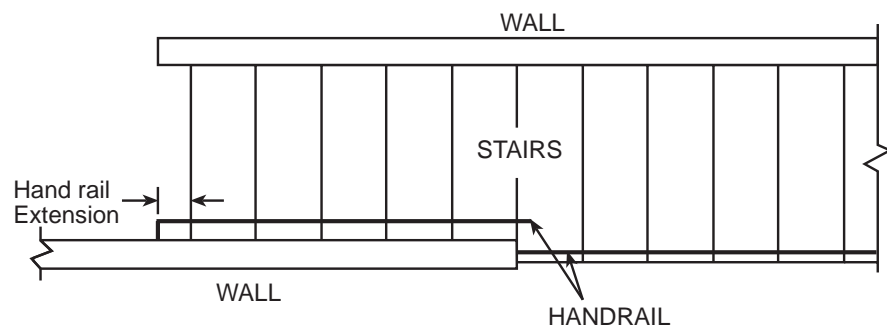
slope to less than 4 inches in height with the variation in height of the bottom or top riser not to exceed 1 unit vertical in 12 units horizontal (8.3% slope) of stairway width. Figure (5).

F. Alternate shape of Landing. A complete curved landing with radius equal to the width of stairway is permitted provided that the ascending and descending portions of the stairway runs meet at a level landing. Figure (4).

#### X. Handrails

A. Handrail Continuity. Handrail gripping surfaces shall be continuous, without interruption by newel posts, other construction elements or other obstructions. Figures (3) and (7) Exceptions:

1. Handrails within single-family dwelling units or in private stairways within individual units of multi-family dwelling units (apartments, condominiums, townhouses) are permitted to be interrupted by a newel post at a stair



THE HANDRAIL DETAIL SHOWN HERE DOES NOT COMPLY WITH THE "CONTINUOUS" TERMINOLOGY IN THE CODE.

**Figure 7** Handrail Continuity

landing.

2. Handrails within single-family dwelling units or in private stairways within individual units of multi-family dwelling units (apartments, condominiums, townhouses), may have starting or volute newels within the lowest tread.

**B. Handrail Graspability.** The handgrip portion of the handrail must not be less than 1 1/4 inches or more than 2 inches in cross-sectional dimension, or the configuration of the handgrip portion must be such that it provides an equivalent, grippable shape. (Disabled access requirements as set forth in the State of California Title 24, Ch 11B, Div. III, Sec. 1133B.4 requires this dimension to be not less than 1 1/4 inch and not more than 1 1/2 inch).

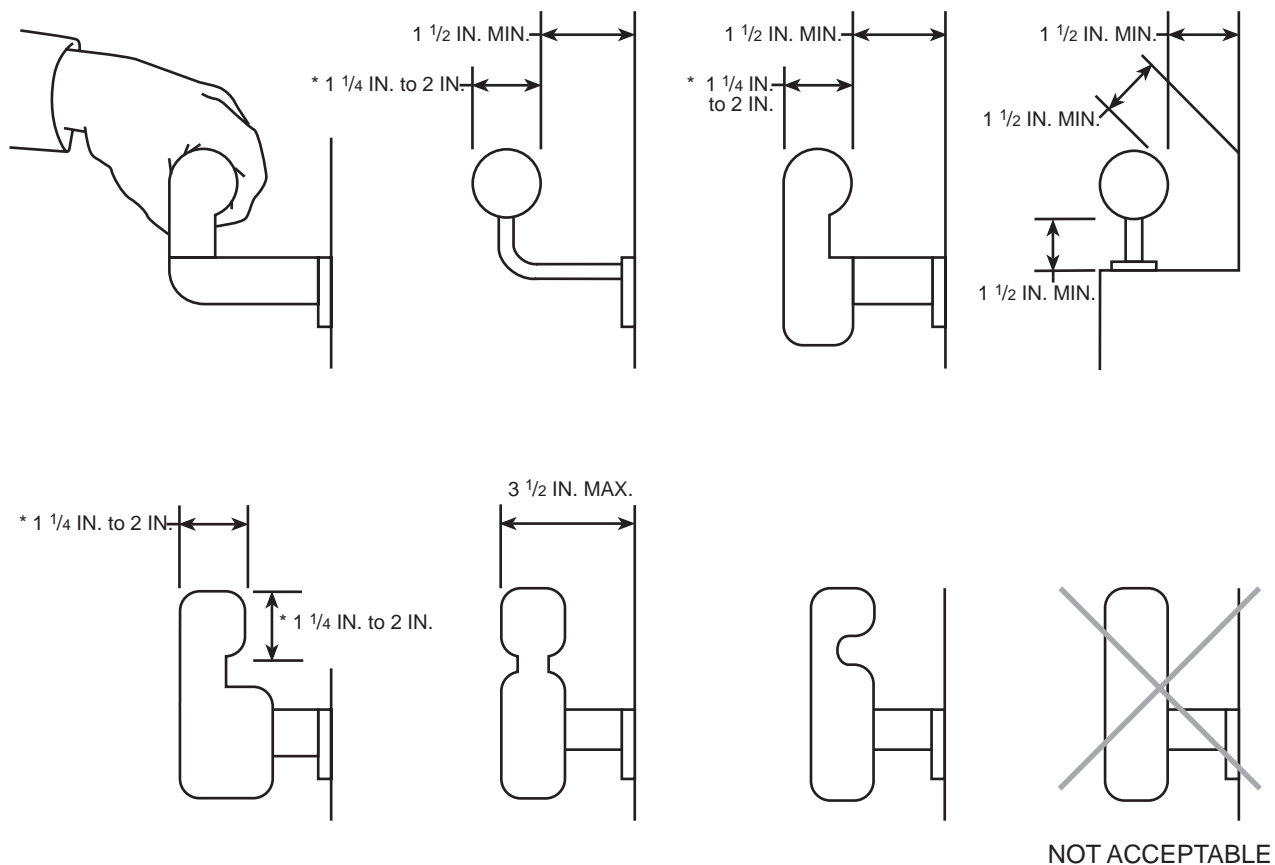
Handrails must be adequately graspable. To provide adequate support or to adequately grasp the handrail, the shape of the handgrip portion must be such a shape that it is possible for the potential user of the handrail to actually wrap

their fingers around the portion of the handrail and, thereby obtain support. Figure (8).

- C. Handrail Surface.** The handgrip portion of handrails shall have a smooth surface with no sharp or abrasive elements. Any wall or other surface adjacent to the handrail shall be free of sharp or abrasive elements. Edges shall have a minimum radius of 1/8 inch.

Gripping surfaces (top or sides) shall be uninterrupted by newel posts, other construction elements or obstructions.

- D. Handrail Clearance.** The clear space between handrail and a wall or other surface shall be a minimum of 1 1/2 inches. Figure (8)
- E. Handrail Projection.** Projections into the required width of the stairway at each handrail shall not exceed 3 1/2 inches. Figure (8).
- F. Handrail Extension.** Handrails shall extend horizontally a minimum of 12 inches beyond the top nosing and 12 inches, plus the tread width, be-



**NOTE:** Other shapes may be acceptable if they provide an equivalent gripping surface. See third paragraph of section 1003.3.3.6.

\* Disabled access requirements as set forth in the State of California Title 24, Ch 11B, Div. III, Sec. 1133b.4 requires this dimension to be not less than 1 1/4 inch and not more than 1 1/2 inch.

**Figure 8** Handrail-Acceptable Shapes and Installations

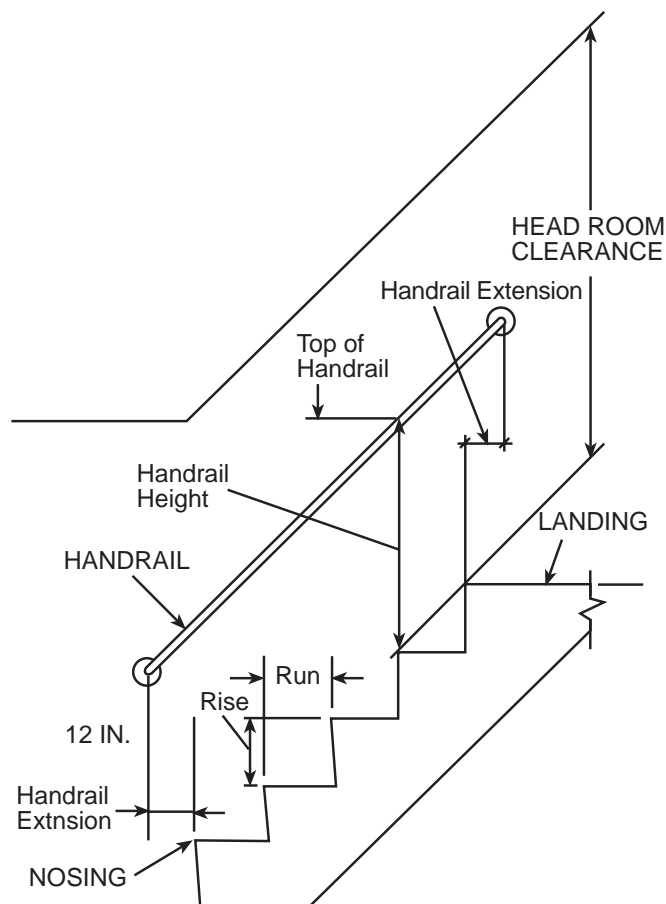
yond the bottom nosing. Figures (3) and (9).

Exception: Handrails within single-family dwelling units and within individual units of multi-family dwelling units (apartments, condominiums, townhouses) that is not required to be disabled accessible, do not require handrail extensions.

G. **Handrail Termination.** Handrail ends shall return to a wall, guard or the walking surface or shall be continuous to the handrail of an adjacent stair flight or shall have rounded terminations or bends or shall terminate in newel posts or safety terminals. Figure (9).

H. **Handrail Height.** The height measured from top of handrail and handrail extensions above landings and the stair tread nosings, shall be uniform, not less than 34 inches and not more than 38 inches. Figure (9).

#### XI. Headroom Clearance



**Figure 9** Handrail and Headroom Clearance

Stairways shall have a minimum headroom clearance of 6 feet 8 inches measured vertically from a line connecting the edge of the tread nosings to the soffit, ceiling, or other construction above the stairway at all points. The minimum headroom clearance shall be maintained the full width of the stairway and landing. Figure (9).

#### XII. Projections Into Width of Stairways

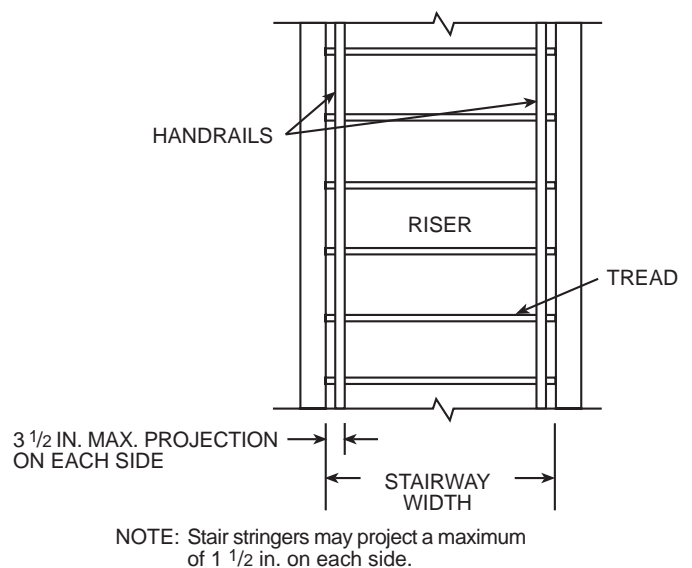
Handrail Projections into the required width of the stairway at each handrail shall not exceed 3 1/2 inches. Stringers and other projections such as trim and similar decorative features into the required width of the stairway shall not exceed 1 1/2 inches from each side. Figure (10).

#### XIII. Steps Within a Flight of Stairs

- A. The term "step" shall mean those portions of the means of egress achieving a change in elevation by means of a single riser. Individual steps shall comply with the detailed requirements of the Building Code that specify applicability to steps.
- B. Steps within any stairway are not allowed.
- C. Step at Landings. In single-family dwellings and in private stairways within individual units of multi-family dwellings (apartments, condominiums, townhouses) landings between flight of stairs may achieve a change in elevation by means of a step (single riser) provided it complies with all other Building Code provisions. Figure (6).

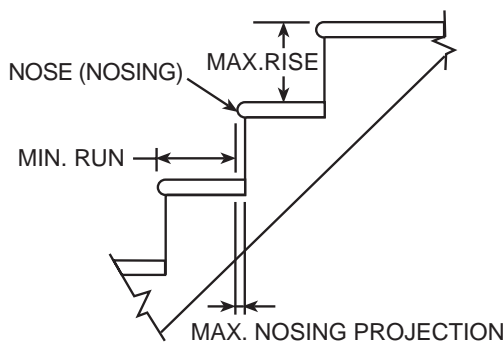
#### XIV. Profile of Stair Treads, Nosings and Risers

- A. Treads. All tread surfaces shall be slip resistant.



**Figure 10** Projections Into Stairway Width





**Figure 11 Rise and Run**

**B. Nosings.**

1. The radius of curvature at the leading edge of the tread shall not be greater than 1/2 inch. (Figure 11)
2. Beveling of nosings shall not exceed 1/2 inch.
3. The leading edge (nosings) of treads shall project not more than 1 1/4 inch beyond the tread below and all projections of the leading edges shall be of uniform size including the leading edge of the floor at the top of the flight.

**C. Risers.**

Risers shall be solid and vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 degrees from the vertical.

(Refer to Title 24, Division III, Section 1133B for disabled accessibility requirements.)

**XV. Glass and Glazing in Handrails and Guardrails**

Interior and exterior glass, glazing in all occupancies in railings shall comply with the Building Code provisions as set forth in Chapter 24.

**A. Design.**

1. Deflection criteria: The framing members for each individual glass pane shall be designed so the deflection perpendicular to the glass plane shall not exceed 1/175 of the glass edge length or 3/4 inch, whichever is less, when subjected to the larger of the positive or negative load when loads are combined as specified in the Building Code, Ch 16, Section 1612.3.
2. Loads: The panels and their support system shall be designed to withstand the load specified in Ch 16, Table 16-B. A factor of safety of four (4) shall be used.

**B. Framing Support.**

1. Glass used as structural balustrade panels in railings. Each handrail or guardrail section shall be supported by a minimum of three glass balusters or otherwise supported so that it remains in place should one baluster panel fail. Glass balusters shall not be installed without a handrail or guardrail attached.
2. Glass used as railing in-fill. Glass shall be

firmly supported on all four edges.

- C. Thickness. For all glazing types, the minimum nominal thickness shall be 1/4 inch.
- D. Identification. Each unit of safety glazing material shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and be visible when the unit is glazed.
- E. Material. Glass used as structural balustrade panels in railings or used as non-structural in-fill panels shall be one of the following types:
  1. Single fully tempered glass.
  2. Laminated fully tempered glass.
  3. Laminated heat-strengthened glass.
- F. Testing of Glass or Glazing. Individual glazed areas in hazardous locations (areas subject to Human Impact Loads) such as those indicated in Section 2406.4, shall pass the test requirements of the Uniform Building Code Standards 24-2, Part I.

**XVI. Stairway Structural Design**

1. Stairways serving an occupant load of 10 or more persons shall be designed for a uniform live load of 100 psf. Stairways serving an occupant load of Less than 10 shall be designed for a uniform live load set forth in the Building Code, Ch 16, Table 16-A.
2. Individual stair treads shall be designed to support a 300-pound concentrated load placed in a position that would cause maximum stress.
3. Stair stringers shall be designed to support a uniform live load set forth in the Building Code, Ch 16, Table 16-A.
4. The mounting of handrails shall be such that the completed handrail and supporting structure are capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail. Building Code, Ch 16, Table 16-B. These loads shall not be assumed to act cumulatively with Item 5 below.
5. Intermediate rails, panel fillers and their connections shall be capable of withstanding a load of 25 psf applied horizontally at right angles over the entire tributary area, including openings and spaces between rails.
6. Stairway components such as balustrades, structural panels, in-fill panels, treads, stringers, railing systems, column support(s), support or framing brackets, attachments and other connections must be designed and detailed to support the applicable dead and live loads.

**XVII. Stairway Approval and Testing Requirements**

1. The Planning and Development Review Department requires that construction materials, products and assemblies used in building construction be tested by an approved



testing agency for conformance to standards provided in the California Building Code as adopted by the City of San Diego. The Department also requires that the products and assemblies be listed by a recognized and approved listing agency. Stairways as an assembly or as a prefabricated assembly may be required to comply with these requirements.

2. Whenever there is insufficient compliance with any of the provisions of the Building Code, City regulations and Ordinances, or evidence that any material or construction does not conform to the requirements of the Building Code, the City of San Diego Building official may require tests as proof of compliance to be made at no cost to this jurisdiction. Building Code, Ch 1, Sec. 104.2.9.
3. Such testing may include but not limited to the whole stairway as an assembly and / or it's components such as stringers, treads, railing systems, structural panels, in-fill panels, railing systems, support columns and connections.
4. On-site load testing must be requested in writing and approved by the City of San Diego, Inspection Services prior to shipment of the stairway or it's components to the job site.
5. All tests and inspections must be performed by a construction materials testing laboratory and special inspection agency approved by the City of San Diego, in accordance with written testing and inspection procedures proposed by the architect or engineer of record and approved by the City of San Diego, Inspection Services.
6. Testing and inspection results are required to be approved by the City of San Diego, Inspection Services before a building permit is issued for construction and installation of the stairway within the building.
7. For additional information and requirements refer to Building Newsletters 17-7 and 17-10.

#### **XVIII. Off-Site Fabrication and Special Inspections**

1. The fabricator's shop, where stairways and stairways components such as stringers, balustrades, treads, tread supports, railing systems, structural panels, in-fill panels, support columns, and support brackets are scheduled to be fabricated, must be registered and approved by the City of San Diego, Inspection Services.
2. An "Application to Perform Off-Site Fabrication" must be submitted to the Inspection Services Division for approval prior to commencing fabrication of stairway or any of it's components.
3. Continuous special inspection (or periodic special inspection as noted and scheduled on the approved plans) may be required for the fabrication of the stairways and the components.

4. Such special inspection must be performed by a special inspector certified by Inspection Services. For additional information and requirements regarding special inspections, refer to Building Newsletters 17-1 and 17-3.
5. For additional information and requirements regarding Off-site Fabrication of Building Components refer to Building Newsletter 17-6.

#### **XIX. Job Site Assembly, Installation, and Special Inspection**

1. Field assembly and installation must be performed in accordance with plans, details and specifications approved and permitted by the City of San Diego, Planning and Development Review Department.
2. During the field welding of any member or connection, continuous special inspection (or periodic special inspection as noted and scheduled on the approved plans) is required.  
For additional requirements and requirements refer to Building Newsletter 17-3.
3. During connection of stairway to the building walls or floor using adhesive anchor systems (epoxy) continuous special inspection is required. For additional information and requirements refer to Building Newsletter 17-5 and the anchor's listing agency approval report.
4. During connection of stairway to the building walls or floor using bolts with expansion anchor systems continuous special inspection may be required. For additional information and requirements refer to the project approved and permitted plans and the anchor's listing agency approval report.
5. Such special inspections must be performed by special inspectors certified by Inspection Services. A list of approved construction materials testing laboratories and special inspection agencies is available from Inspection Services.

#### **XX. Examples Of Stairways Configuration**

Some examples of stairways configuration are provided in this newsletter to illustrate Building Code provisions and requirements. Figures (12), (13) and (14).

#### **XXI. Plan Review and Permits**

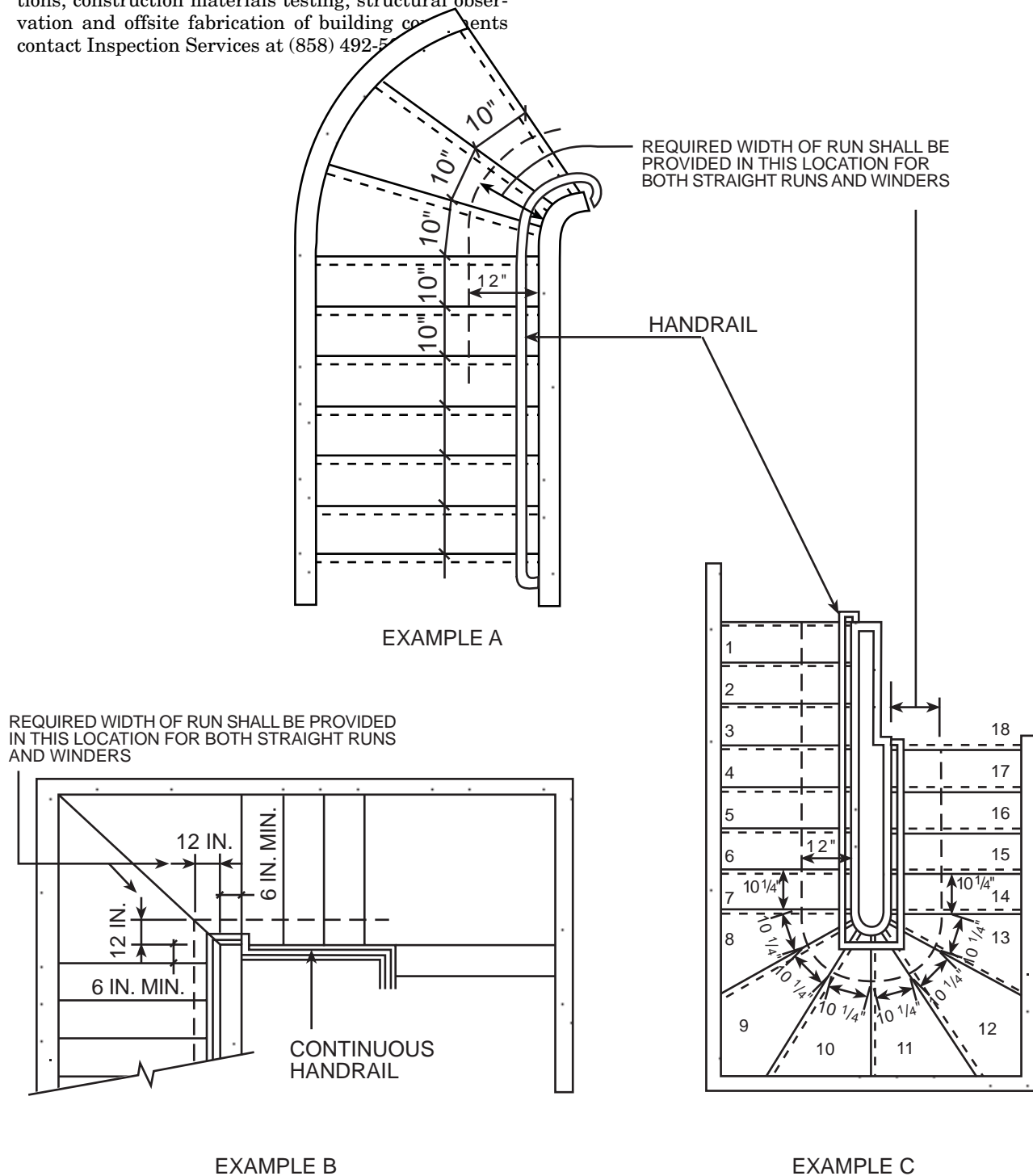
1. Plans, details, specifications and structural calculations must be submitted to the City of San Diego, Planning and Development Review Department for review and approval prior to fabrication of stairways.
2. Construction documents stated under Item 1 above must be prepared, stamped and signed by an architect or an engineer licensed to practice in the State of California.
3. For further information on plan submittals, master plan and permit issuance contact Information and Application Services at

619-446-5000.

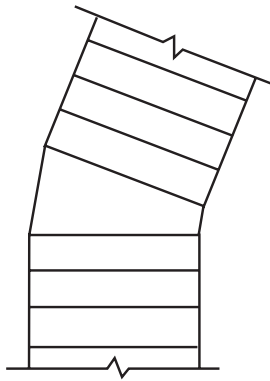
## XXII. Further Information and Questions

For additional information and requirements refer to Building Newsletters 17-1 thru 17-8 and 17-10.

For questions regarding testing and special inspections, construction materials testing, structural observation and offsite fabrication of building components contact Inspection Services at (858) 492-5000.

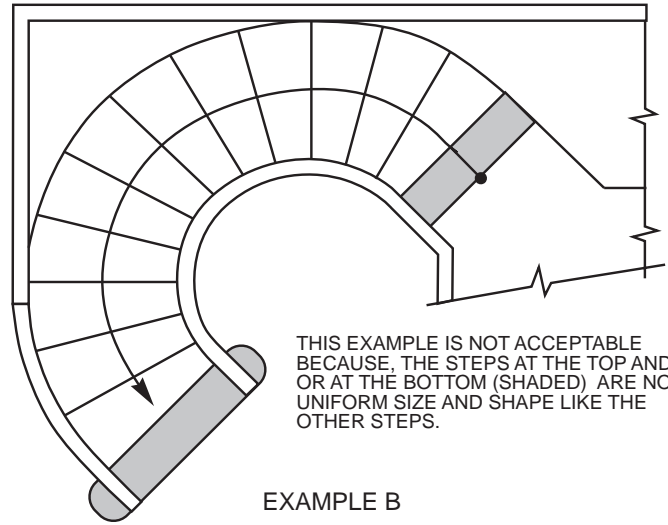


**Figure 12** Combination of Straight Stairways with Winding Stairway



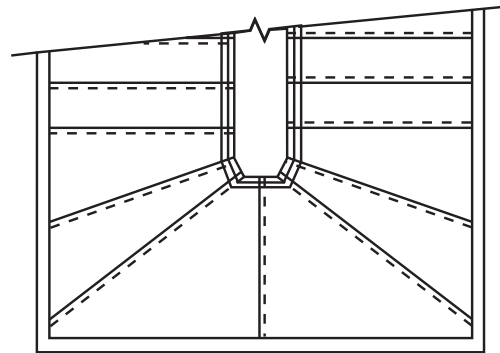
THIS EXAMPLE IS NOT ACCEPTABLE BECAUSE, AS A STEP IN THE MIDDLE OF A STAIRWAY, IT IS NOT A UNIFORM SIZE AND SHAPE LIKE THE OTHER TREADS. ADDITIONALLY, IT DOES NOT COMPLY AS A LANDING.

EXAMPLE A



THIS EXAMPLE IS NOT ACCEPTABLE BECAUSE, THE STEPS AT THE TOP AND / OR AT THE BOTTOM (SHADED) ARE NOT UNIFORM SIZE AND SHAPE LIKE THE OTHER STEPS.

EXAMPLE B



THIS EXAMPLE IS NOT ACCEPTABLE BECAUSE THE WINDERS ARE NOT UNIFORM IN SIZE AND ARE NOT CONSISTENTLY SHAPED.

EXAMPLE C

**Figure 13 Non-Complying Stairway Configurations**

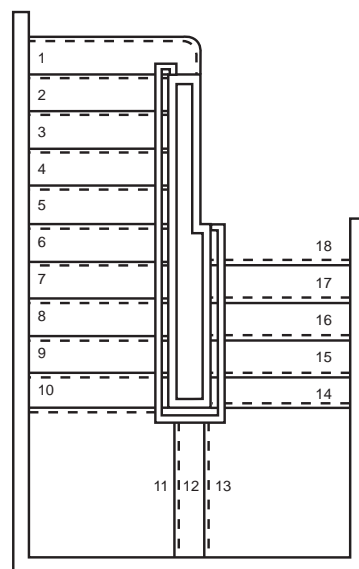


FIGURE 14 ILLUSTRATES DEPARTMENT POLICY FOR TREAD AND HANDRAIL TERMINATION FOR RESIDENTIAL STAIRS (R-3 AND WITHIN UNITS OF R-1). HANDRAILS MAY START WITHIN THE FIRST TREAD (SEC. 1003.3.3.6 Ex 2). THE FIRST TREAD MAY BE WIDER THAN THE OTHER TREADS.

**Figure 14 Residential Stairways**